

Response  
SN 09/823,053  
Page 2

IN THE CLAIMS

Please cancel claim 12 and consider the remaining pending claims as follows:

1. **(Original)** In a network, a method for segmenting a streaming multimedia clip into a plurality of sequentially organized data segments of exponentially increasing size and distributing said streaming multimedia clip from an origin server to a plurality of streaming caches which comprise a distribution set in said network, the method comprising the steps of:

determining a size (L) of the multimedia clip;

segmenting the streaming multimedia clip into a plurality of data segments of exponentially increasing size; and

distributing the plurality of data segments from the origin server to said plurality of streaming caches, wherein an i-th data segment is distributed in an i-th distribution round to each of said plurality of streaming caches.

2. **(Original)** The method according to Claim 1, wherein the size of an i-th data segment is computed as  $L / 2^{(N+1-i)}$

where N is the total number of segments, and

where i is an index defining each of the N segments, (i= 1,2,...,N).

3. **(Original)** The method according to Claim 1, wherein the size L of the multimedia clip is measured in units of time.

4. **(Original)** The method according to Claim 1, wherein the segmenting step further comprises the steps of:

determining in an m-th distribution round if a data segment of said multimedia clip is equal to or greater than a predetermined threshold value, said m-th data segment referred to as a threshold data segment; and

dividing a remaining undivided portion of said multimedia clip into data segments having a predetermined segment size if the data segment of said multimedia clip is equal to or greater than a predetermined threshold value.

295928\_1.DOC

Response  
 SN 09/823,053  
 Page 3

5. **(Original)** The method according to Claim 4, wherein said remaining undivided portion is divided into data segments in successive rounds having an index  $m+1$  through  $N$ .

6. **(Original)** The method according to claim 4 wherein the predetermined segment size is equal to the size of the threshold data segment.

7. **(Original)** The method according to claim 4 wherein the predetermined segment size is computed as:

$$2^{(r-1)} * \delta$$

where  $\delta = L / 2^{(N-1)}$  the size of a first segment; and

where  $r$  is a user adjustable parameter to determine the segment size for those fixed

segments which occur once the predetermined threshold has been reached.

8. **(Original)** The method according to Claim 5, wherein  $\delta$  is on the order of 5 to 30 seconds.

9. **(Original)** The method according to Claim 4, wherein the values for  $\delta$ ,  $r$  and  $m$  are

determined by an origin server in accordance with an origin server aware scheme.

10. **(Original)** The method according to claim 4, wherein the values for  $\delta$ ,  $r$  and  $m$  are

determined by inter-cache communications in an origin server transparent scheme.

11. **(Original)** The method of Claim 1, wherein the distributing step further comprises the step of:

295928\_1.DOC

Response  
SN 09/823,053  
Page 4

at each of said plurality of streaming caches, storing an i-th data segment of said streaming multimedia clip with probability equal to  $1/2^{(i-1)}$  in an i-th distribution round, where  $i = 1, 2, \dots, N$ .

12. **(Cancelled)**

13. **(Original)** A method of distributing a segmented streaming multimedia clip among

a plurality of streaming caches, comprising the steps of:

at each of said streaming caches:

storing an i-th data segment of the segmented streaming multimedia clip with probability equal to  $1/2^{(i-1)}$ .

14. **(Original)** The method according to Claim 13, further comprising the step of:  
storing an i-th data segment of said segmented streaming multimedia clip with probability equal to  $[1/2^{(i-1)}] * e(x)$ , where  $e(x)$  is a constant that is proportional to a popularity rating of the clip, where  $0 \leq e(x) \leq 1$ .

15. **(Withdrawn)** A method of replacing segments in an SC, the method comprising:

- (a) computing a potential function for each stored segment in said SC;
- (b) sorting said stored segments into one of a plurality of bands wherein said bands are organized from a highest order band to a lowest order band, said bands being defined by an upper and a lower band boundary having values corresponding to the potential function; and
- (c) replacing segments as needed in a sequence starting from those segments stored in said lowest order band to said highest ordered band, wherein segments are replaced in each band starting with segments having a corresponding lowest potential function value.

16. **(Withdrawn)** The method of Claim 14, wherein said potential function is computed for a segment j of clip i as:

295928\_1.DOC

Response  
SN 09/823,053  
Page 5

$F(i,j) = \text{Prob (selecting a clip with rank } i) * \text{Prob (selecting segment } j \text{ of the clip)}$

where rank is determined using a global clip hotness rating.

17. **(Withdrawn)** The method of Claim 15, wherein said potential function is quantized prior to said sorting step.

18. **(Withdrawn)** A method of replacing segments in an SC, the method comprising:

- (a) identifying a multimedia clip in said SC having a lowest global clip hotness rating;
- (b) in the case where it is determined that said identified multimedia clip's global hotness rating is lower than a first threshold;
  - (1) removing said identified multimedia clip from said SC; and
  - (2) repeating steps (a)-(b) until either a sufficient amount of disk space is freed to terminate said method or step (b) is not satisfied;
- (c) if step (b) is not satisfied, removing a number of segments of said identified multimedia clip from said SC starting from a last segment until either a sufficient amount of disk space is freed to terminate said method or a predefined threshold percentage of said identified multimedia clip remains; and
- (d) if the predefined threshold percentage of the clip remains, identifying a multimedia clip in said SC having the next lowest global clip hotness rating, and repeating step (c).

19. **(Original)** A system for segmenting, distributing and replacing segments of streaming multimedia clips in a network, comprising:

- at least one origin server storing said streaming multimedia clips;
- a plurality of streaming caches in communication with said at least one origin server, said plurality of streaming caches defining a distribution set;
- first processing means associated with said at least one origin server for segmenting

295928\_1.DOC

Response  
SN 09/823,053  
Page 6

the streaming multimedia clip into a plurality of data segments of exponentially increasing size and for distributing said plurality of data segments to each of said plurality of streaming caches; and

second processing means associated with each of said plurality of streaming caches for storing data segments received from said at least one origin server in a SC and for replacing said stored data segments from said SC.

20. **(Original)** The system of Claim 19 wherein said second processing means further comprises

means for computing a potential function for each stored data segment for replacing segments.

21. **(Original)** The system of Claim 19 wherein said second processing means further comprises

means for computing a probability to determine whether to store or discard each data segment received from said at least one origin server.